

CLAIMS

1. A method for producing a threaded tubular connection consisting of a male tubular element (1) comprising a tapered male thread (3), a female tubular element (2) comprising a tapered female thread (4) which cooperates with said male thread (3), and a deformable sealing ring (130) interposed between the male and female elements to oppose fluid communication between the outside of the threaded tubular connection and the zone of cooperation of said threads, characterized in that:

- the sealing ring is placed around the male element (1) beyond its thread (3) with respect to its free end (7), the sealing ring (130) comprising a body and a retaining lip (143) with a radial thickness that is less than that of the body, extending axially towards the thread (3) from a shoulder (144) defining the body and having a thinned zone (145) in the vicinity of the body, said thinned zone (145) being in contact with an annular rib (53) provided as a radial projection on the male element; and
- the free end of the male element (1) is engaged in the female element (2) and the male thread is made up into the female thread, the sealing ring being progressively introduced into a first annular housing (20) provided in the female element in the form of an enlargement of its axial boring extending axially from its free end (14) to a shoulder (25) and having a peripheral surface (21, 22) adjacent to said shoulder (25) which cooperates over at least a portion of its axial length with the radially outer surface (131, 139) of said sealing ring to radially compress the latter and establish a sealed contact between said radially outer (139) and inner (132) surfaces of the sealing ring on the one hand, and said peripheral surface (21, 22) of the first housing (20) of the female element and the facing

surface (52) of the male element 1 on the other hand, the body (146) then being pushed along the male element by the shoulder (25) of said first housing (20) of the female element (2), after mutual abutment of the two shoulders (25, 144), and the annular rib (53) of the male element (1) coming into contact with the retaining lip (143) at the end of makeup beyond said thinned zone (145), to cause the retaining lip to penetrate into a second annular housing (18) formed in the female element (2) at an axial distance from the first housing (20) to ensure axial retention of the sealing ring by the female element.

- 5 2. A method according to claim 1, in which the sealing ring is formed from a material selected from synthetic materials, malleable metals and composite materials.
- 10 3. A method according to claim 1 or claim 2, in which the sealing ring is formed from a material with a low coefficient of friction with the material from the male element.
- 15 4. A method according to one of the previous claims, in which the sealing ring is formed from filled or unfilled polytetrafluoroethylene.
- 20 5. A method according to one of the preceding claims, in which at the end of makeup, the annular rib (53) of the male element (1) brings the retaining lip (143) into contact with the flank of the second annular housing (18) of the female element (2) disposed on the side of the shoulder (25) of the first housing (20).
- 25 6. A method according to one of the preceding claims, in which opposite the free end (7) of the male element, the male thread comprises runout threads (13) the radial height of which generally reduces from a nominal value to a zero value.
- 30 7. A method according to one of the preceding claims, in which said peripheral surface (21, 22) of the first housing (20) comprises a substantially cylindrical surface (20) adjacent to its shoulder (25) with a diameter that is substantially equal to that of a sub-

stantially cylindrical outer surface (131) of the body.

8. A method according to one of the preceding claims, in which said peripheral surface (21, 22) of the first housing (20) comprises a flared surface (21) adjacent to the free end (14) of the female element.

9. A method according to one of the preceding claims, in which the male element (1) has an axial abutment surface (7) close to its free end, which surface can cooperate with an axial abutment surface (8) of the female element (2) to limit makeup.

10. A method according to one of the preceding claims, in which said thinned zone is defined by an annular groove (145) formed in the radial inner surface (132) of the sealing ring (130) and which can receive said annular rib (53) of the male element to maintain the sealing ring (130) in position after placing it on the male element.

11. A method according to claim 10, in which prior to assembly, said radially inner face (132) of the sealing ring (130) has a substantially constant diameter with the exception of said annular groove (145).

12. A method according to claim 11, dependent on claim 10, in which said annular rib (53) is defined by two annular grooves (51, 52) with bottom surfaces that are machined to be substantially cylindrical and of the same diameter to cooperate with said radially inner face (132).

13. A method according to claim 12, in which the annular groove (52) defining said annular rib (53) that is opposite to the free end (7) of the male element has a flank (54) opposite to said rib (53) that is slightly inclined with respect to the axis of the connection which at the end of makeup comes into contact with the radially inner surface (132) of the sealing ring to reinforce compression of said latter and the seal of the connection.

14. A method according to one of the preceding claims, in which the body (146) is solid and is connected to a

head (136, 137) with a radial thickness that is greater than that of the body, extending axially from the body opposite to the retaining lip and having a recess (135) disposed between its radially outer (139) and inner (132) surfaces.

5. 15. A method according to claim 14, in which the radial compression of the sealing ring includes radial compression of the head (136, 137) and its recess (135).
10. 16. A method according to claim 14 or claim 15, in which said recess is in the form of an annular groove (135) radially separating the head into two portions (136, 137) respectively adjacent to the radially outer (139) and radially inner (132) surfaces.
15. 17. A method according to claim 16, dependent on claim 7, in which the portion (136) of the head adjacent to the radially outer surface (139) bears on the substantially cylindrical surface (22) of the first housing when makeup is complete.
20. 18. A method according to claim 16 or claim 17, in which said annular groove (135) has a V shaped profile.
19. 25. 20. A method according to one of claims 14 to 18, in which said outer surface (139) of the head gradually flares from a substantially cylindrical surface (131) of the body to the free end of the head (136, 137).
30. 21. A method according to one of the preceding claims, in which the first and second housings (20, 18) of the female element (2) together define an annular projection (16) with a minimum diameter that is substantially equal to the maximum outer diameter of the retaining lip in order to overlap the latter during makeup.
35. 22. A method according to claim 20, in which when compression of the sealing ring (130) commences, said annular projection (16) is disposed beyond the annular rib (53) on the male element (1) on the free end (7) side of the male element.
22. A method according to claim 20 or claim 21, in which said annular projection (16) is disposed in alignment

with the annular rib (53) of the male element (1) when the two shoulders (25, 144) come into mutual abutment.

23. A method according to one of the preceding claims, in which the second annular housing of the female element
5 is in the form of a groove (18) in one flank of which the female thread (4) opens.

24. A deformable sealing ring (130) for use in the method according to one of the preceding claims, comprising a body (146) and a retaining lip (143) with a radial thickness that is less than that of the body, extending axially from a shoulder (144) defining the body and having a thinned zone in the vicinity of the body which is defined by an annular groove (145) formed in the radial inner surface (132) of the sealing ring
15 (130).

25. A set for use in the method according to one of claims 1 to 23, comprising:

- a deformable sealing ring (130) comprising a body (146) and a retaining lip (143) with a radial thickness that is less than that of the body, extending axially from a shoulder (144) defining the body and having a thinned zone in the vicinity of the body;
- a male tubular element (1) comprising a tapered male thread (3) and a radially projecting annular rib (53) beyond said thread (3) with respect to its free end (7); and
- a female tubular element (2) comprising a tapered female thread (4) which can cooperate with the male thread (3), a first annular housing (20) provided in the female element in the form of an enlargement of its axial boring, extending axially from its free end (14) to a shoulder (25) and having a peripheral surface (22) adjacent to said shoulder (25), and a second annular housing (18) disposed at an axial distance from the first housing (20).

26. A threaded tubular connection obtained by the method of one of claims 1 to 23, comprising a male tubular

element (1) comprising a tapered male thread (3), a female tubular element (2) comprising a tapered female thread (4) which cooperates with the male thread (3), and a deformable sealing ring (130) interposed between the male and female elements to oppose fluid communication between the outside of the threaded tubular connection and the zone of cooperation of said threads, the sealing ring (130) being positioned axially between said threads and the free end of the female element (2) and comprising a body (146) and a retaining lip (143) with a radial thickness that is less than that of the body, extending axially towards said threads (3, 4) from a shoulder (144) defining the body and having a thinned zone (145) in the vicinity of the body, the body being housed in a first annular housing (20) provided in the female element in the form of an enlargement of its axial boring, extending axially from its free end (14) to a shoulder (25) and having a peripheral surface (22) adjacent to said shoulder (25), which is in contact with the sealing ring for radial compression thereof, a radially projecting annular rib (53) provided on the male element being in contact with the retaining lip (143) beyond said thinned zone (145) to cause the retaining lip to penetrate into a second annular housing (18) formed in the female element (2) at an axial distance from the first housing (20) to ensure axial retention of the sealing ring by the female element.